

ABSTRACT

A transpose of data appearing in a plurality of processing elements comprises shifting the data along diagonals of the plurality of processing elements until the processing elements in the diagonal have received the data held by every other processing element in that diagonal. Shifting along diagonals can be accomplished by executing pairs of horizontal and vertical shifts in the x – y directions or pairs of shifts in perpendicular directions, e.g. x-z. Each processing element stores data as its final output data as a function of the processing element's position. In one embodiment, an initial count is either loaded into each processing element or calculated locally based on the processing element's location. The initial count may be given by one of the following expressions:

$$(x + y + 1) \text{ MOD (array size)}$$

$$(C + R + 1) \text{ MOD (array size)}$$

$$(C + y + 1) \text{ MOD (array size) or}$$

$$(x + R + 1) \text{ MOD (array size).}$$

Thereafter, the initial count is modified by a programmable amount at programmable intervals so that when the current count equals a desired or target value, the current data is selected as the final output data.